

ACCESS TO WATER IN THE SLUMS OF THE DEVELOPING WORLD

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1 INTRODUCTION

According to the United Nations Human Settlements Programme (UN-Habitat), 924 million people lived in slums in 2001. Population growth in these settlements is much greater than in other urban areas. The estimates suggest that this figure may rise to 1.5 billion by 2020 (Payne, 2005). This rapid increase is expected despite “slum upgrading” efforts that have been taking place for decades, though inconsistently and with disruptions over time.

There is a prolific literature on informal settlement areas, but research on access to essential services such as water and sanitation (WS) in these areas is very limited. Most studies consider issues of access in connection to urban poverty, an approach that often reduces the discussion to the income and expenditure constraints faced by households. Examining access to WS in the slums spurs an appreciation of the multidimensional nature of the problem, including income poverty, infrastructural limitations, asset ownership and housing quality. Moreover, developments in the slums concern every aspect of the Millennium Development Goals (MDGs).

This paper examines the conditions of access to water in the slums of the developing world. It has three goals. The first is to identify the objective and policy-related challenges that hinder progress in the provision of safe, affordable, continuous and easy access to water in countries where there is a sizeable slum population. The second is to explore the existing systems of provision in informal settlements and to discuss the weaknesses and strengths of each. The third is to make policy recommendations. Though the discussion on access to sanitation is limited, this is not to deny the importance of that issue. Besides, water and sanitation services are often intrinsically linked and therefore are provided together by network utilities.

The discussion reveals the failure of public policies as well as markets to provide satisfactory solutions to the problems of access to a safe, affordable and continuous water supply. In many countries, especially those in Sub-Saharan Africa, access to safe water through household connections declined in the 1990s. Achievements in access rates in many Asian and African economies are due to widespread use of public water points such as public standpipes and kiosks. These sources are important, but doubtless the quality of access to water with these facilities is unsatisfactory since they involve greater effort by households, involving queuing, carrying water and lacking continuous access. A substantial proportion

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of urban dwellers in developing countries, especially in unplanned settlements, rely on a wide range of small-scale providers whose services are vital in the absence of alternatives. Their services, however, are often inferior to those provided by the formal network. Invariably, the water charges of alternative sources are higher than those for supply from the public network.

Section 2 provides a general discussion of informal settlements and outlines the growth of slum development and trends in access to water supply since 1990. Section 3 examines changing public policies towards squatter settlements and the challenges such settlements pose. Section 4 presents the problems associated with the existing market-based water supply arrangements in countries where a sizeable proportion of the urban population resides in informal settlement areas. We then argue for the need to pursue a more proactive public policy on the basis of a discussion that highlights the limitations of private sector ventures. The paper concludes with a number of policy recommendations.

2 TRENDS IN SLUM DEVELOPMENT AND CONDITIONS OF ACCESS TO SAFE WATER

The word “slum” has been controversial and some researchers have avoided it on the grounds that it carries highly negative connotations of slum-dwellers with its emphasis on social disorder, crime, filth and so on. Other terms, such as informal settlement or periurban areas, are more neutral in their meaning, though they may understate or otherwise belie the real living conditions in slums that clearly need to be the subject of public policy. In this paper we use the word “slum” interchangeably with other terms such as unplanned, informal, periurban and squatter settlements.

What constitutes a slum differs from one country to another. In Bangladesh, for example, a slum is composed of “a cluster of compact settlements of five or more households that generally grow very unsystematically and haphazardly in an unhealthy condition and atmosphere on government and private vacant land” (Hanchett et al., 2003: 44).

In contrast to this broad and vague definition, the Brazilian Demographic Census, for instance, considers a slum to be composed of one or more adjacent subnormal clusters containing a set of at least 51 housing units (maximum, 350) occupying or having occupied until recently lots that were not owned by the dwellers, generally arranged in an unordered and dense manner and mostly lacking in basic public services (IBGE, 2000: 229).

Living conditions in slums vary not only from one country to another but also from one settlement to another within the same country. Some countries classify slums in different ways to distinguish those with greater deprivation in terms of urban living standards. For example, the terms *favelas*, *loteamentos*, *invasões* and *cortiços* describe in descending order Brazilian slums with greater to lesser urban development. In Buenos Aires, *asentamientos* are considered to be proper slums whereas *villas* are squatter settlements that have undergone some process of urban development and consolidation. Similarly in Sri Lanka, labour lines, unserved urban neighbourhoods and shanties all refer to different categories of slums.

Much of the discussion in this paper is based on a more widely used definition provided by UN-Habitat (2003), according to which a slum is characterised by:

- (i) overcrowding;
- (ii) poor housing conditions, as reflected in hazardous location, tenure insecurity, impermanent structure and insufficient living area (three or more people per room);
- (iii) inadequate access to: improved water¹ at affordable prices and without extreme effort; improved sanitation² to a private or public toilet shared with a reasonable number of people; and other infrastructure services.

On the basis of this definition, it was estimated that about a third of the world's urban population lived in slums in 1990, and this proportion has barely changed since then. The situation is particularly acute in Africa where, on average, over 70 per cent of the urban population live in informal settlement areas. The proportion of the population living in squatter settlements increased in a third of the African countries listed in Table 1. In another third there has been no reduction or only very minor reductions in the share of their populations living in periurban areas. While the concentration of the slum population is relatively less in Latin America and Asia, some countries in these regions are comparable to those in Africa, including Afghanistan, Bangladesh, Nepal, Pakistan, Bolivia, Guatemala, Nicaragua and Peru.

These estimates, however, are far from precise because of data limitations regarding the conditions of tenure and access to services. For example, most of those living in periurban areas rely on both improved and unimproved sources of water (UNDP, 2006; World Bank, 2006b). They may be using public standpipes, unprotected wells and water from vendors all at the same time. Second, the presence of boreholes, protected wells and springs does not necessarily mean that safe water is available, especially in conditions of widespread ground water contamination as a result, for example, of a lack of proper sanitation facilities. Third, some settlement areas have access to potable water at least through kiosks or public taps, yet they may be classified as slums because of lack of tenure or poor housing.

The increase in urbanisation and its disproportionate concentration in informal settlements are problematical for the expansion of water and sanitation services (WSS). Often, a lack of private connections to water and sanitation networks is closely linked to poverty and to the proportion of the population residing in unplanned settlement areas. In Kenya, for example, only 5 per cent of poor households have a residential water supply. In the slums of Nairobi, 19 per cent of the population have household connections (Gulyani et al., 2005; Gulyani and Talukdar, 2008).

In many cities, access to water through private household connections from network infrastructure is substantially low (see Table 1). Again, African countries fare the worst. The data reflect the following salient features for the continent. First, access to improved water facilities declined in more than a third of African economies during the period 1990–2004. Second, more than two-thirds of the urban population in African countries relied on water from non-residential connections. Such reliance is notably high even in the few countries that recorded some improvement in all the indicators included in Table 1 (Benin, Mali, Mauritania and Rwanda). In half of the African countries listed in the table, the proportion of residential water connections either declined or was steady.

TABLE 1

Selected Indicators of Slum Population and Access to Water

	Slum pop. to urban pop. ratio		Urban pop. w/o access to improved drinking water		Urban HHs w/o residential piped water supply			Slum pop. to Urban pop. ratio		Urban pop. w/o access to improved drinking water		Urban HHs w/o residential piped water supply	
	1990	2001	1990	2004	1990	2004		1990	2001	1990	2004	1990	2004
N. Africa							SSA						
Algeria	12	12	5	1	34	26	Angola	83	83	77	25	99	85
Egypt	58	40	3	1	11	1	Benin	80	84	27	22	82	75
Morocco	37	33	16	29	25	14	Botswana	60	61	0	0	60	38
Tunisia	9	4	6	1	13	6	Burkina Faso	81	77	39	6	76	69
Yemen	68	65	1	12	33	41	Burundi	83	65	3	8	68	58
Asia							Cameroon	62	67	23	14	74	75
Afghanistan	99	99	90	37	94	85	Chad	99	99	59	59	90	90
Bangladesh	87	85	17	18	72	76	Côte d'Ivoire	51	68	27	3	53	52
China	44	38	1	7	19	13	Eritrea	70	70	38	26	60	58
India	61	56	11	5	47	53	Ethiopia	99	99	19	19	98	68
Indonesia	32	23	8	13	73	70	Ghana	80	70	14	12	60	63
Myanmar	31	26	14	20	82	84	Kenya	70	71	9	17	41	48
Nepal	97	92	5	4	59	48	Lesotho	50	57	-	8	82	47
Pakistan	79	74	5	4	40	51	Liberia	70	56	15	28	79	99
Philippines	55	44	5	13	59	42	Madagascar	91	93	20	23	72	84
Sri Lanka	25	14	9	2	64	68	Malawi	95	91	10	2	56	71
Thailand	20	2	2	2	30	15	Mali	94	93	50	22	92	71
Viet Nam	61	47	10	1	60	27	Mauritania	94	94	68	41	80	68
LAC							Mozambique	95	94	17	28	67	82
Argentina	31	33	3	2	24	17	Namibia	42	38	1	2	17	23
Bolivia	70	61	9	5	22	10	Niger	96	96	38	20	81	65
Brazil	45	37	7	4	10	9	Nigeria	80	79	20	33	68	85
Chile	4	9	2	0	2	1	Rwanda	82	88	12	8	76	66
Ecuador	28	26	18	3	26	18	Senegal	78	76	11	8	50	25
El Salvador	45	35	13	6	26	19	Sierra Leone	91	96	-	25	-	40
Guatemala	66	62	11	1	30	11	South Africa	46	33	2	1	13	13
Honduras	24	18	8	5	18	9	Sudan	86	86	15	22	25	54
Mexico	23	20	11	0	14	4	Tanzania	99	92	15	15	67	57
Nicaragua	81	81	9	10	15	16	Uganda	94	93	20	13	76	93
Paraguay	37	25	19	1	40	18	Zambia	72	74	14	10	47	59
Peru	60	68	11	11	25	18							

Source: UN-Habitat (2007).

Note: w/o = without; pop. = population; HH = households; LAC = Latin America and the Caribbean; SSA = Sub-Saharan Africa.

Finally, an emerging trend is that access rates to improved drinking water increased in 10 of 30 African economies between 1990 and 2004, but this was accompanied by declining rates of direct household connections. In other words, much of the improvement was achieved through a rise in non-residential sources of supply. This trend is confirmed by household studies. For example, Gandy (2006) reports that household connections in Lagos, Nigeria, declined over time and currently only 5 per cent of households in the city are connected to the public water system; less than 1 percent have access to a closed sewer system. The rest of population depend on wells, boreholes, water tankers, various illegal connections, street vendors and "scooping" water from open drains by the side of the road. Related to this trend is the decline in per-capita water consumption over the long term. In the urban sites of East Africa, for example, the proportion of households with piped supply declined in Tanzania and Uganda in the period 1967–1997. Per-capita water consumption declined more drastically in the region during the same time period (Table 2).³

TABLE 2

Piped Water Supply and Water Use in Urban Sites

	Per capita water use (litres per day)	
	1967	1997
Kenya	104.7	45.2
Tanzania	113.8	70.5
Uganda	73.7	47.0
East Africa	98.7	54.9

Source: Thomson et al. (2008).

Combining the evidence provided above, we can conclude that the 1980s and 1990s, a period of neoliberal reforms, have been “the lost decades” in most African countries in terms of achieving improved access to water.

Trends in access to safe drinking water are much better for Asian countries, but lack of access to a piped network supply remained very high in most countries included in Table 1. Again, this is because an increase in access to safe water is largely achieved through shared water facilities. In Latin American countries, on the other hand, despite a markedly large slum population, a great many slum-dwellers appear to have direct access to a piped water supply in their own yards or homes. The picture is quite mixed in North African countries.

In summary, the network utilities are failing to expand access to water and sanitation, particularly in periurban areas. The conditions are quite dire in much of Africa and in some parts of Asia. In the case of water, the gap between access in general and access via household connections is closed by a host of other providers including carters, tanker truckers, vendor-operated water points, community-managed projects, public standpipes, boreholes and wells. Numerous studies demonstrate the diversity and importance of small-scale suppliers in informal settlements (see, for example, Kariuki and Schwartz, 2005; Kjellén and McGranahan, 2006). In the slums of Nairobi and Abidjan, more than 80 per cent of the population rely on sources other than household connections, including kiosks, water resellers and other small-scale providers (Obrist et al., 2006; Gulyani and Talukdar, 2008).

These other sources of supply can be characterised in three ways. The first is the mode of supply—either small network or mobile. The second is the water source they rely on—either dependent on the main network utility or independent of it (sourcing water from boreholes, wells and so on). The third is the management structure—either privately, publicly or community-operated. Public standpipes may be operated on a concessionary basis by private or community-employed managers (Solo, 2003). While these sources play a crucial role where provision from public networks is absent, the quality of their supply is far from ideal. This will be discussed in further detail in Section 4.

3 CHANGING PUBLIC POLICIES AND CHALLENGES IN SQUATTER SETTLEMENTS

3.1 PUBLIC POLICY

Informal settlements in urban centres go through various phases of *ad hoc* regularisation over long periods. In this process, some are connected to a formal water and sanitation network. In relatively new periurban settlements, the inadequacy of supply and the difficulty of access remain serious. The provision of water and sanitation depends on the general attitude of governments towards these areas. Public policy varies by country, and over time within countries. Broadly speaking, there are three kinds of government actions in dealing with informal settlement areas and the associated problems: (i) clearance of slums through forced or legal evictions; (ii) sluggish public policies ranging from benign neglect to occasional interventions; and (iii) regularisation of settlement conditions.

In general, the whole process is highly politicised. Various country-specific factors such as the politics of slum management, or the strengths of social resistance groups and non-governmental organisations (NGOs), influence the nature of public policies. In countries with a large slum population and some democratic processes, whereby a change of political authorities through the electoral system is a possibility, governments may not easily escape the consequences of evictions or their own inertia. Nonetheless, recognition of conditions in the slums and policies to improve them have economic as well as political costs. Providing services such as water and sanitation in squatter settlements or areas of relocation involves devoting a greater share of government revenues to this purpose. But the redistribution of a larger proportion of tax revenues to benefit slum-dwellers has political consequences, as does the redistribution of land for the same purpose. The political undercurrents of the slum administration process are well described by Aguilar and De Fuentes (2007: 256):

“[In Cancun] the municipal, state and federal governments have adopted different positions because on some occasions they have regarded the settlers as potential voters and have not contemplated removing them in order to avoid conflict, while at other times they have supported the idea that they should be removed.”

Although there has been a gradual and very long-term shift away from evictions, they are still used extensively, especially in Africa and Asia where more than 14 million people were evicted between 1998 and 2006 (UN-Habitat, 2007). In some countries, consensual removal with some compensation is being used as another option.

An alternative is regularisation, which has been used increasingly through “slum upgrading” or relocation of dwellers to designated areas. Slum upgrading costs less than relocations to fully planned and serviced areas, and causes limited disturbance to the lives of the households in periurban areas. This approach was extensively used by the World Bank in the 1970s and 1980s, because it was seen as compatible with “the small-state view”. Governments did not have to mobilise massive resources for high-standard planning, housing and infrastructure. Instead, they took existing arrangements as given but aimed to improve the slum environment by tackling the problems of access to water, sanitation, waste and so on. Re-evaluation of these projects some decades later showed that their long-term sustainability was doubtful:

“By the end of the 1980s, the benefits of these slum upgrading efforts appeared ephemeral ... Most water standposts became useless. Water wasted through leakages in the worn-out pipes, public taps and standposts ... The population [became] dependent upon water vendors. Communal toilet and washing blocks were ineffective because of poor maintenance, unreliable water supply and poor location, suggesting that they were becoming “a wasted investment” ... The slum upgrading approach requires a very powerful as well as humanistic bureaucracy to carry it out successfully. The “minimal state” [approach] is a dangerous illusion. To keep slum upgrading costs down, development agencies often propose low standards of infrastructure. Consequently, facilities rapidly deteriorate ... Primarily because of problems of maintenance, only a minority of the World Bank’s urban projects are considered by its Operations Evaluation Department to be sustainable” (Werlin, 1999: 1525–1528).

By the end of 1980s, comprehensive slum upgrading projects were abandoned by major development agencies such as the United States Agency for International Development (USAID) and the World Bank on the grounds of cost overruns, political corruption and delays in infrastructure development caused by prolonged land titling processes. Instead, they focused on small-scale projects in some neighbourhoods, paying particular attention to infrastructure services, often with low standards (Gulyani and Bassett, 2007).

The public policy for the provision of water and sanitation services in informal settlement areas is further complicated by interaction of the general attitude of governments with a number of other problems. Most important in this respect are tenure for housing (and/or land), technical difficulties in service provision, and the shift in the development paradigm towards neoliberalism. These are discussed in turn below.

3.2 LAND AND HOUSING TENURE

Common to all informal settlements is the often dubious nature of their legal status. This can be seen mainly in terms of their land tenure, which is often not granted because of the invasion of public or private land or the construction of dwellings that fail to meet urban planning regulations (Torres, 2007). The procedures for granting tenure and implementing urban development plans frequently take decades. In Lima, for example, it took about 20 years to legalise informal settlements. In Tanzania, it takes at least seven years to identify an area for the implementation of urban planning (Payne, 2005).

Lack of tenure often leads to lack of information. Municipal data on residents is typically based on real estate and other administrative records. Such information is not available for informal settlements, whose residents are effectively “invisible” to the authorities. The information resources for more established informal settlements in older areas of a city are generally better than those for more recent periurban expansion (Torres, 2007). The most comprehensive source of information on informal settlements has been census surveys, although these are often outdated because of the rapid development of urban expansion in some locales. Alternative methods of data collection are beginning to be used in some cities, as local NGOs are used to map settlements in countries such as Kenya (Satterthwaite et al., 2005).

Lack of tenure has repercussions, first in terms of the obligation of network utilities to provide services, and second in terms of the absence of information on the settlements. The remit of network utilities to provide water services to the population depends on residents

having secure tenure of their property, outlined either in legislation for public utilities or in contracts for private utilities. Secondary to the issue of land tenure is the status of the buildings themselves. Depending on local regulations, if they are not constructed to a suitable standard they will also be exempt from statutory service provision (Torres, 2007). It has been widely observed (Satterthwaite et al., 2005; Trémolet and Hunt 2006; Water Utility Partnership 2003; WaterAid 2006a) that across the developing world, network utilities are commonly not obliged to expand service provision to those without secure land tenure. This is true for both public and private utilities (Mitlin, 2002).

The public policy dilemma is to resolve the problem of access to services without creating perverse incentives for faster slum growth. The nature of water service provision is distinct from other utilities in its permanence, since pipes are normally laid underground. Since electricity and telephone service lines hang overhead, the infrastructure may be moved or removed without significant cost or disruption. As the Water Utility Partnership (2003: 23) notes: "... the concern amongst authorities [is] that if pipes are installed in areas without legal status, their permanence may be seen as providing a stamp of approval or some degree of legitimacy to the residents."

Granting full tenure can lead to an increase in house and land prices, as well as a rise in rents in and around the legalised areas, and encourage the development of new slum areas. Property merchants may take advantage of the situation and formalisation may benefit the non-poor rather than the poor. Dwellers may sell their plots at higher prices and re-squat.

A number of alternative policies have been discussed in the literature and tried in practice. UN-Habitat (2007), for example, advocates various interim occupancy rights such as granting non-transferable short-term leases, collective property rights, use of community land trusts and protection against eviction. Payne (2005) suggests using communal land rights as a way of providing security of tenure and hence access to public services. This option would reduce the administrative burden and thus the delays in the process of regularisation. It would also allow access to public services, including water and sanitation, without triggering increases in property prices. In practice, use of this option has been limited. A more frequent approach is the provision of infrastructural services, including water and sanitation, without granting formal titles to dwellers. It has been argued that the development of infrastructure itself provides an effective tenure security. This option has been used in Côte d'Ivoire (Gulyani and Basset, 2007) and in Dhaka, Bangladesh (WaterAid, 2006b) where legal tenure was not considered as critical for connection to water supply networks. The same issues have been noted in Bangalore, India, where alternative forms of identification have been used as a means to acquire a connection (Connors, 2005; WSP, 2006).

3.3 TECHNICAL BARRIERS TO EXPANSION OF THE FORMAL WATER NETWORK

Some informal settlements develop spontaneously, with little government intervention or planning and little information about the residents or the plots on which residences are built. The consequence is that if infrastructure expansion were to be authorised and financed, the practical and technical difficulties of development are significant. The technical barriers to network expansion in informal settlements can be classified into three categories.

- *Topographical location of settlements* on the periphery of cities, or in previously unused land such as flood plains, hills, ravines and desert land, makes the expansion of standard network utilities technically difficult.
- *Physical conditions of settlements.* Whereas water utilities in planned areas may be arranged by construction under a central roadway with residential connections branching off this, such a conventional approach is impractical in crowded informal settlements that have a random and haphazard development pattern.
- *Quality of housing units.* The materials used in the construction of dwellings in many squatter settlements, such as thickened mud, plant leaves and stems, tin and plaster boards, are unsuitable for the stability and permanence of water pipes and taps.

Many unplanned settlements in or outside the urban centres of the developing world suffer from one or more of these difficulties, which hinder the extension of the water network. In Mexico City, for example, steep hillsides and dried-up lake beds have been invaded in some parts of the city, and conditions in those areas are not conducive to the development of water infrastructure. Other, topographical factors in Abidjan (Côte d'Ivoire), such as plateaus rising to 50 metres, led to the spatial segregation of slums and created significant barriers to the development of urban services (UN-Habitat, 2003). In Dar Es Salaam:

"Between the arterial roads, there are large areas that are not serviced and these have developed into unplanned settlements. Many of these areas are located in hazardous areas such as river valleys, flood-prone land and hill slopes ... Servicing these areas is difficult due to the nature of the terrain and the density and layout of the settlements" (WaterAid, 2003: 10).

In Egypt, informal settlements in desert land present a different set of difficulties associated with the lack of stability of potential infrastructure and housing structures. In Rio de Janeiro, many slums are situated on hills, swamps or in residual public areas, such as under viaducts and along roads where extension of the water network is impossible. In São Paulo, some dwellings are built with materials such as tin, cans and even cardboard (UN-Habitat, 2003).

3.4 THE NEO-LIBERAL POLICY SHIFT IN THE PROVISION OF WATER SERVICES

A prominent trend in the supply of water and sanitation since the 1980s has been the move towards restructuring urban WS systems on the basis of market-oriented policies through privatisation and/or commercialisation. The former requires profitability of investment and operations, while the latter is founded on the principle of cost-recovery as a minimum condition. Both entail a commercial pricing strategy with limited use of subsidies. Under the coercive influence of international financial institutions that provided policy-conditional lending and drew upon the microeconomic theories of privatisation for non-monopolistic sectors (Florio 2006), policymakers in developing countries have been expected to achieve operational efficiency and higher investment in the water and sanitation sectors, quite often disregarding country-specific conditions such as the predominance of slums and high levels of urban poverty.

The shift towards private or commercialised public provision of services in general, and of water and sanitation in particular, has meant that the “development state” has become dysfunctional. Where implemented, the neoliberal reforms have been a pretext for governments to reduce public investment in infrastructure, including water and sanitation. This has been demonstrated by Calderón et al. (2003) in Latin America. In other regions there is limited information on public investment levels in water and sanitation, but the few available sources suggest that similar trends are at work. In Zambia, for example, after the commercialisation of water and sanitation services, the public investment budget for the sector was reduced from about US\$ 12 million to US\$ 6 million between 1998 and 2002 (Dagdeviren, 2008). The actual public capital expenditure in the country, however, ranged from US\$ 0.1 million to US\$ 0.5 million in the same period. Gulyani et al. (2005) make the same point for Kenya.

Nevertheless, public capital spending financed by loans from international financial institutions to facilitate privatisation has increased considerably in the reform period. The World Bank database on Private Participation in Infrastructure (PPI) indicates that 70 per cent of the investments involving PPI projects were made by governments, 8 per cent by donors and only 22 per cent by private investors (Estache, 2006). This argument is supported by Guasch and Straub (2006: 483): “Despite its growing involvement, private capital never fully compensated the parallel reduction in public investment”, and therefore where implemented, private sector participation has contributed to a growing “infrastructure gap”.

4 WHY IS A MORE ACTIVE STATE INTERVENTION NECESSARY IN THE WATER AND SANITATION SECTORS?

4.1 OVERVIEW

Safe drinking water is essential for the sustenance of human lives. Access to water was considered a human right by the UN Economic and Social Council in 2002 (UNESOC, 2003). There are three fundamental reasons for states to play a more active role in the provision of water and sanitation.

First, universal access to safe drinking water has positive externalities in the form of reduced rates of illness and mortality. Associated with these are the gains from reducing the number of workdays lost and the medical costs of treating waterborne and related illnesses such as cholera, typhoid, trachoma and malaria. According to Hutton et al. (2006) there are enormous returns to achieving universal coverage in water and sanitation (Table 3). The return on every US dollar invested in water and sanitation is more than US\$ 5 in Sub-Saharan Africa and South Asia, more than US\$ 10 in the Arab States and East Asia, and more than US\$ 35 in Latin America.

This paper’s focus on access to water should not understate the significance of a lack of access to sanitation facilities for the health of nations in general and for the safety of drinking water in particular. In fact, inadequate access to sanitation is a much more pressing problem in developing countries and more so in informal settlement areas. The extract below reflects conditions in Jakarta:

“Open canals, largely conduits for sewage, regularly overflow into city streets during the rainy season. As a consequence, poor water quality in the piped network (partially reliant on surface water sources within the city), and in shallow groundwater (the source for the majority of the city’s poor residents) is of particular concern” (Bakker et al., 2008: 1,896).

TABLE 3

Cost-Benefit Ratio of Achieving Universal Water and Sanitation Coverage

	Water	Sanitation	W & S
Sub-Saharan Africa	3.9	6.5	5.7
Arab states	5.9	12.7	11.3
East Asia and Pacific	6.6	13.8	12.2
South Asia	3.9	6.8	6.6
Latin America	17.2	39.2	36.3

Source: Hutton et al. (2006).

The circumstances are not very different in other developing countries. Obirst et al. (2006: 324) present a similar story about the slums of Abidjan, Côte d’Ivoire:

“[In the slums of Yopougon] the open drainage channels are filled with heaps of garbage and smelly wastewater ... The situation gets particularly precarious during the rainy season, when large areas along the channels are flooded. All toilets and latrines emptied into self-made cesspits or into the drainage channels ... “Grey” water [is] disposed of in public spaces, in the cesspits, in the drainage channels or in the courtyard.”

Second, water networks involve large-scale sunk investment costs. Financing such costs through cost-plus pricing is difficult in many developing countries, where welfare and social security systems are absent and the affordability of water prices, especially for poor and low-income households, is a problem. This places a constraint on the viability of privately operated water and sanitation networks.

Third, there are specific failures associated with the private supply of water in informal settlement areas. These are discussed in the next subsection, which highlights the limitations of privatised network supply, community schemes and small-scale providers in squatter settlements.

4.2 FAILURE OF PRIVATE SOLUTIONS IN THE SLUMS OF THE DEVELOPING WORLD.

4.2.1 Problems with Privatised Network Supply

The privatisation of water services in many developing countries has been ineffective, especially in the relatively longer term; competition has not worked (Lobina, 2005; Kirkpatrick and Parker, 2006). Studies have found no statistically significant difference between public and private operators (Estache et al., 2005; Bakker et al., 2008). Cost recovery without substantial tariff adjustment has been difficult: about 70 per cent of utilities fail to cover their capital costs (Komives et al., 2005). The affordability of services, especially connection costs, for low-income households and the poor has become an important issue even in the middle-income

economies of Latin America. Serious weaknesses have been identified in regulatory objectives, processes, capacity and the institutional environment in developing countries (Bell, 2003; Parker and Kirkpatrick, 2004; Minogue and Cariño, 2006). In countries like Argentina, which initially attracted considerable foreign investment to its water sector through privatisation, private companies fell into disrepute and were eventually re-nationalised following years of disputes and renegotiations (Baer and Montes-Rojas, 2008, Casarin et al., 2007).

Although the successes and failures of water privatisation have been discussed extensively in the literature, to date there has been no analysis of its impact in the context of demographic and settlement conditions in the cities of the developing world. Table 1 shows that more than half of the urban population live in slums in 28 out of 30 countries in Africa, seven out of 12 countries in Asia and four out of 12 in Latin America.

Given the problems of cost recovery, affordability and regulation in planned urban settlements, what would the privatisation of the water and sanitation sector offer in countries where a significant proportion of the population live in squatter settlements? Considering the complexities of tenure, technical difficulties and so on in informal settlement areas, the potential for the private sector to improve access to water is even more doubtful. This is why provision by privatised network utilities is often limited, and why small-scale water providers have a persistent and substantial presence in periurban areas. Infrastructure improvements by private concessionaires have been prioritised in those neighbourhoods that can meet the expense of such developments. Ensuring full cost recovery and the profitability of water services through privatisation and commercialisation is politically difficult, and there is a potential for significant public opposition to the policy where it is attempted (Komives et al., 2005; Botton and Merlinsky, 2006).

Furthermore, unless explicitly specified otherwise, private utilities are not normally obliged to extend provision to residents without tenure. Clauses in concession or lease contracts, which specifically require the extension of services to informal settlements, were generally absent from “most of the contacts negotiated in the 1990s” and bidders were “not required to outline their strategy for improving services to low-income residents” (McGranahan and Satterthwaite, 2006). This can be seen in the development of the private water supply contract in Dar Es Salaam, Tanzania, which excluded an obligation on the part of the private operator to expand services to periurban settlements, and only a small amount of funding provided separately by the donor agencies was devoted to improving connections (WaterAid, 2003). The same was true of SODECI’s service contract with the government of Côte d’Ivoire, which excluded slums where residents obtain water from customers with household connections who resell water to those without taps (Obrist et al., 2006).

Where expansion of service provision has been included in contractual terms, the weakness of host country governments in contract development has been evident. In particular, the terms and scope of expansion have not been explicit, and private firms have sought to “reinterpret” the contract after privatisation in an attempt to reduce their investment commitments. This has been true in the Córdoba water concession in Argentina, where the contract terms on service expansion were ambiguous and the private firm’s subsequent commitment to expansion was less than that intended by the municipal government in the contract development phase (Lobina and Hall, 2007).

It has also been evident in some concession contracts that the private operator has been granted exclusive rights to water sources across the geographical area of the contracted

provision. Such exclusivity includes sources of water such as rivers, lakes, boreholes, wells and so forth and, if this exclusivity were enforceable, it would have serious repercussions for people in informal settlements who rely on alternative sources of water; this has been the case, for example, in Cochabamba, Bolivia (Nickson and Vargas, 2002).

One implication of this discussion is that the debate on the ownership and management of the water network and the drive for privatisation in the last three decades has bypassed most urban dwellers and has been of negligible relevance for the population living in slums.

4.2.2 Problems with Urban Community-Managed Projects

The notion that community participation is important for successful water service provision has developed recently, from its recognition in the “Dublin Principles” of 1992 to the promotion of the “empowerment” of local-level actors at the Second World Water Forum in 2000 (Warner, 2006). The development of principles in such international fora has been followed by a revised policy in international agencies such as the UN and World Bank. The latter has funded a “Poverty and Social Impact Analysis” programme recommending the increased implementation of “water user associations” in informal settlements in order to improve water service provision (WaterAid, 2008; McGranahan and Satterthwaite, 2006).

Community-run, small-scale projects play a crucial role in the provision of an essential service, especially in the absence of any alternative. Typically, local community groups or “community-based organisations” (CBOs) form operational partnerships with international NGOs that facilitate technical and financial resources where available. WaterAid, an NGO active in the development of community-based water provision in informal settlements in developing countries, describes its typical operation in Dar Es Salaam, Tanzania:

“A community-based water project involves setting up a social infrastructure that can manage community water and sanitation needs, like a local water committee and health committee. It will then proceed to build a physical water infrastructure, typically a community water kiosk. Water kiosks are located strategically in communities. The water committee employs people to operate and run the kiosk. Community-mapping in the wards where WaterAid works revealed that kiosks have now become the main water source for household drinking and washing” (WaterAid, 2003: 34).

A similar scheme in Bangalore, India, allowed groups of five to ten families to collectively own a communal connection, which reduced the complexity and cost of construction (WSP, 2006). Parallel success stories have been recorded in the slums of Dhaka, Bangladesh, with the assistance of NGOs and CBOs (Hanchett et al., 2003; Akbar, 2007). In many cases, NGOs act as a “guarantor” for the residents of informal settlements, in an attempt to circumvent the prohibitive restrictions on land tenure. The performance of these schemes, where implemented, has proved to the municipal authority that, contrary to the prevailing notion of informal settlements, residents were often not itinerant and were able to pay for services. The prohibitive restrictions on land tenure have subsequently been relaxed, giving more residents the chance of acquiring a network connection (Jinnah, 2007). The CBO “Orangi Pilot Project” in Pakistan has successfully replicated pilot projects in informal settlements across the country, initially in sanitation but subsequently including water (Hasan, 2006). Cooperatives are also particularly prominent in some Latin American countries.

Urban community water and sanitation schemes, however, are not problem-free. It is important to recognise that even within informal settlements there are social hierarchies and variations in the degree of poverty, factors that determine the success of community participation. Social hierarchy frequently determines the extent to which the community organisations are representative, and consequently who benefits from provision within the community. As Mitlin (2002) notes, community-based water provision can also be exclusionary and discriminatory, failing to serve the interests of all in the community. In the decision-making fora central to community participation, those with the strongest and most powerful voices are often the ones who influence the direction of the operation. Concomitant to this process is the lack of capacity of the poor, or the absolute poor within informal settlements, to express their needs or wishes, because of lack of education or assurance (Torres, 2007).

The experience of community-based projects in Lilongwe, Malawi, reveals both the potential benefits of well organised projects and also the problems that arise when community groups are subject to abuse of power by community leaders. In Lilongwe, before an NGO's involvement in water provision in informal settlements, control of community-operated kiosks was exploited by community leaders, who appropriated a percentage of the income and subsequently indebted the kiosks to the network utility that provided the water supply (WaterAid, 2008). The literature raises other concerns about the mobilisation of residents within the community for a sustained period during community-project operations. It is often problematic to resolve social disputes and divisions, a circumstance that constrains the sustainability of community-managed projects (Werlin, 1999; Hanchett et al., 2003; Akbar et al., 2007).

"In meetings [for the management of WS facilities], and in the community baseline survey, relatively vocal and well-off people tended to dominate. [Those] among the poorest section of the community ... tended not to participate in meetings in the absence of special efforts to ensure their participation" (WaterAid, 2006c: 5).

In addition, it is often argued that community cohesion is necessary for the successful operation of collective water schemes but such cohesion, unlike in rural areas, can be less likely in heterogeneous urban contexts, particularly newly-settled periurban areas where population turnover is quite high.

These examples show how certain projects and policies in specific contexts can be subject to local interpretation and transmutation, depending on existing traditional or customary hierarchies, as well as on social laws and customs (Ogus, 2004 and 2005). This argument can be expanded to encompass broader concerns about the fallacious nature of participatory methods and their distraction from more critical, if long-term, issues of structural macro-inequality that sustain poverty more generally (Cooke and Kothari, 2001).

Raising revenues for maintenance and for the salaries of caretakers requires community water schemes to operate on a cost-recovery basis, but this in itself may lead to the exclusion of the poorest of the poor. Because of the small scale of the facilities, community-managed schemes often charge higher prices than network suppliers. For the same reason, cross-subsidisation is not feasible. This is why in many cities such as Dar es Salaam, poor households rely on shallow wells and rivers that are often contaminated (Kyessi, 2005). Studies of water and sanitation projects in the slums of Chittagong and Dhaka indicate similar problems (Hanchett et al., 2003; Akbar et al., 2007).

The long-term maintenance of collectively-used water schemes can be difficult for various reasons, including the lack of long-term commitment by NGOs, social cohesion, technical and management capacity, and financial resources. This is apparent in the slums of Côte d'Ivoire, where "water pipes installed earlier were dilapidated" (Obrist et al., 2006). In the periurban settlements of Yombo Dovya and Tungi in Dar es Salaam, some traditional wells and pumps deteriorated and were eventually abandoned for various reasons (Kyessi, 2005). The maintenance of collective water assets by formal utilities is also problematic following commercialisation and ring-fencing or privatisation, as evidenced by the cases of Bangalore and Zambia (Connors, 2005; Dagdeviren, 2008).

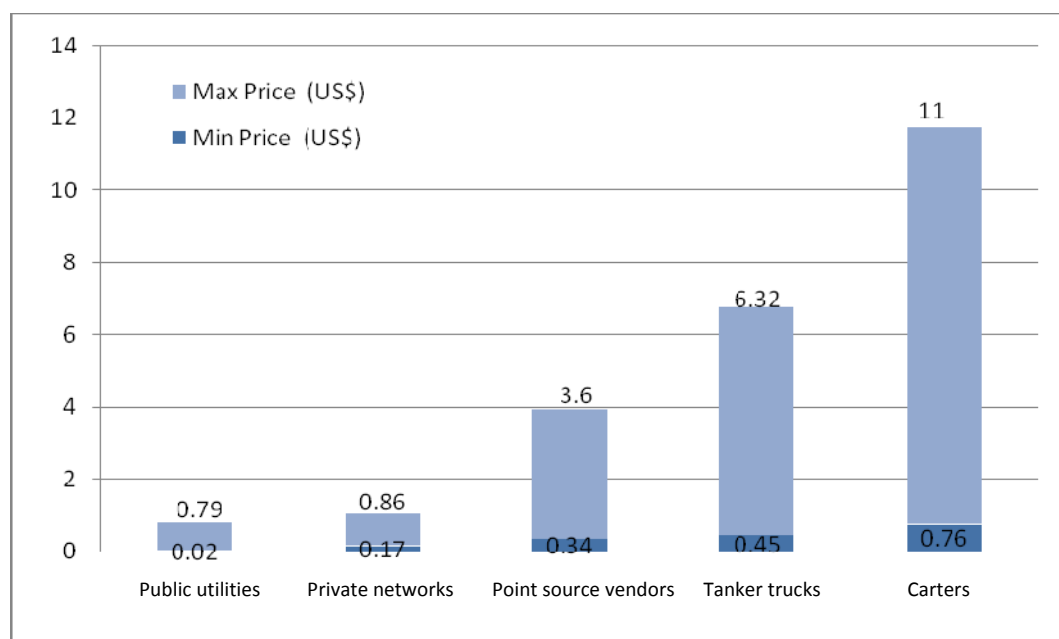
4.2.3 Problems with Small-Scale Private Providers

It is estimated that small-scale private providers (that is, excluding community or publicly operated water schemes) supply 25 per cent of the urban population in Latin America and East Asia, and 50 per cent of the urban population in Africa (Dardenne, 2006). While these providers have a substantial presence in urban areas, especially in the slums of the developing world, their services may be beset by three problems: high prices per unit of water supplied, poor water quality, and difficulty in regulating the providers.

First, in all circumstances, piped water connected to a city's main network has the lowest tariffs per unit of water, as shown in Figure 1. In some countries, including Kenya, high water charges by small-scale providers are associated with excess profits (Gulyani et al., 2005); in other countries they reflect the cost incurred by the operator (Solo, 2003; Kariucki and Schwartz, 2005; Kjellén and McGranahan, 2006). This is especially the case for mobile distributors whose prices reflect the transport and distribution costs of the small amounts of water carried. They further reflect the cost of the numerous intermediaries necessary in the process of mobile distribution (WSP, 2004a).

FIGURE 1

Water Tariff by Different Providers (\$US per cubic metre)



Source: Kariucki and Schwartz (2005). Data based on 47 countries, 93 locations.

In general, a lack of economies of scale is the most important cause of high unit costs in the operation of small private water suppliers. Moreover, where small-scale providers are dependent on the network utility as a water source, increasing block tariffs negatively affects the poor, as higher prices are passed on from household resellers or other private providers to the poor. The negative impact of increasing block tariffs has been noted in Manila (WSP, 2002) and Côte d'Ivoire (WSP, 2004a).

Second, the quality of the water sourced by private providers from groundwater is highly dependent on the quality of sanitation services in the locale. Note, for example, in Côte d'Ivoire (Obrist et al., 2006), and Dar Es Salaam, where outbreaks of cholera and other water-borne disease have occurred in informal settlements, and where inadequate sanitation facilities cause waste to be disposed of in areas where groundwater is collected (WaterAid, 2003; Kyessi, 2005). The improvement of sanitation services is thus "inextricably linked" to the improvement of water provision (World Bank, 2006a).

Water quality is also highly dependent on the source that suppliers use. If they depend on the public network, the water is more likely to be of a reasonable quality and uncontaminated than if it is sourced independently from private wells or boreholes reliant on potentially contaminated groundwater. The quality of the water that reaches the consumer, of course, depends on the quality of construction or working methods: for example, mobile distributors who transfer water between multiple containers run a much higher risk of contamination. Small providers are more likely to be conscious of quality concerns because their consumer base remains static (Kjellén and McGranahan, 2006). Mobile distributors do not necessarily have repeated interaction with the same consumer base, and are therefore less likely to face complaints or to lose custom because of poor quality.

Finally, where regulation is absent, which is often typical, prices may be subject to collusion between private providers, especially where market entry is restricted by either high sunk costs or a restricted number of licences; this has been observed, for example, in Dar Es Salaam (Kjellén and McGranahan, 2006). Profiteering is possible where small private providers are subject to control by a social hierarchy or power groups, as has been the case in Lilongwe, Malawi, where public kiosks have been controlled by local leaders who have siphoned off profits and have not passed on savings to consumers (WaterAid, 2008). In some cities such as Lagos and Dhaka, small private suppliers used violence and deliberately vandalised the water supply system in order to stop efforts by municipal authorities to expand the public network to the slums (Gandy, 2006; Akbar et al., 2007).

Regulation is desirable as a means of achieving quality standards that may otherwise be unknown, and of lessening the risk of profiteering or the development of cartels. But the regulation of private suppliers is intrinsically difficult and costly because of their size, number and variety (Batley, 2004; Dardenne, 2006). Self-regulation by vendor associations is a less costly option, but their credibility may not always be guaranteed. As mentioned earlier, there are already forms of self-regulation in some informal settlements, where operators work within a known community and their continued operation is dependent on the service they provide and the price they charge to consumers (Kjellén and McGranahan, 2006).

Furthermore, the absence of formal regulation of private providers is closely related to the latter's legal status. The legal status of small providers varies greatly between cities, as does the attitude of the authorities toward those operating illegally. Commonly they operate illegally but are tolerated by the municipal authority, which recognises their important

role in providing service to a significant number of people in informal settlements that are not served—and are unlikely to be served in the near future—by network utilities. As Kjellén and McGranahan (2006) note, one example is Accra, Ghana, where household resellers, though operating illegally, have been transferred from an increasing block tariff to a commercial tariff “effectively acknowledging current practice”.

Considering the lack of coverage by network utilities in informal settlements, many authorities view small-scale private providers as delivering an essential service to a significant and increasing proportion of the urban population. Hence these providers typically operate in an uncertain and unpredictable legal and policy framework, caught in a limbo between official tolerance and illegality under the law (Conan and Paniagua, 2003; Mehta and Virjee, 2003). It is common in Dar Es Salaam, for example, for small private suppliers to resell water within the supposed monopoly of the network utility:

“Selling water from a private domestic connection is prohibited, since only DAWASA is empowered by law to sell water. However, given the prevailing circumstances of widespread shortages, this prohibition could not be enforced ... Vendors just go on with their trade despite the threat of sanctions. To date, there seems to be no case of a water vendor or an owner of a private connection being prosecuted for engaging in the sale of water. In fact, some retailers and water vendors are known to be ex-DAWASA employees” (WaterAid, 2003: 33).

This status for small providers suits the authorities: they gain a service that otherwise would be difficult to deliver but they are not responsible for providing the regulation of suppliers that might be demanded because of complaints about prices and quality.

The foregoing description of the status of small private suppliers is typical, but there are some examples of the municipal authority authorising the legal operation of autonomous service providers in areas previously considered a monopoly for the network utility. For example in Ho Chi Minh City, Vietnam, in 2001 the authorities took the view that the network utility was unlikely to meet the MDG targets for water provision and thus began to contract small suppliers to provide water. These contracts are of limited duration, after which the assets return to the municipal authority (Conan and Paniagua, 2003). Similarly, in Abidjan, Côte d'Ivoire, the municipal authority has authorised the reselling of water within informal settlements by licensing small providers (WSP, 2002).

Without doubt, small-scale providers, whether public or private, fill a significant gap in periurban areas in the absence of public provision of water and sanitation services. The role of the small-scale providers and community-managed water schemes cannot be ignored, but it is important to recognise their drawbacks and use them as intermediate measures to relieve the access problems in the short to medium term, while placing the emphasis for the medium and longer term on urban planning and the merits of public provision. This is especially true inasmuch as none of the substitute providers can be considered as superior or comparable alternatives to water supply from a well monitored and regulated public water utility. This point is particularly important given current trends in policy circles favouring greater reliance on substitute providers under the pretext of “community participation”, “empowerment of local people” and “development of local entrepreneurship”.

With small providers and community-managed schemes, moreover, the quality of access to water is almost always inferior to access from the public network. More specifically, access through small providers invariably entails a lack of continuous access, but it may also involve queuing for a long time, carrying water in containers, sometimes over long distances, and home treatment (such as boiling water). While quality of access is an important issue and deserves attention, it does not feature in policy discussions that often advocate interim and low-cost solutions.

5 POLICY RECOMMENDATIONS

5.1 COORDINATED PUBLIC SECTOR INTERVENTIONS ARE NECESSARY

There are two reasons why state action and public provision must supersede initiatives based on the private sector. First, many of the potential solutions to the problems of slum development in general, and access to water and sanitation in particular, require multifaceted interventions that lie within the authority of governments. Urban planning in general requires a strong public administrative system with good coordination between various ministries to solve the issues of tenure, land division, planning for other urban amenities and prioritisation of applications for housing. Moreover, public resources such as land can be offered below market rates and public credit with long-term maturity can be lent at low interest rates. Measures like these are unlikely to be initiated by the private sector unless the profitability of such subsidised schemes is ensured through transfers from public revenues, which in itself would increase the cost of development projects.

Second, there are substantial returns to economies of scale in the water sector. Small-scale water sellers, who do not have this advantage, have a high unit cost of production and hence offer water at high prices. As for large-scale private sector investment in the water sector, the low rate of return in squatter settlements undermines their viability. In Nairobi, for instance, for the private sector to enter the market it is estimated that water tariffs must be around \$US 1 per cubic metre and users should pay an upfront deposit of \$US 67 to enable cost recovery (Gulyani et al., 2005). The affordability of such tariffs and connection rates clearly pose a problem for the population in general, and even more so for those in squatter settlements.

5.2 POLITICAL ECONOMY ISSUES IN THE PROCESS OF RESOURCE ALLOCATION

It is important to point out that our emphasis on the failures of market-based solutions should not mask the failures of governments to make long-term sustainable progress in squatter settlements. To date, states have not had an impressive record of preventing the development of slums. Their capacity to tackle problems in informal settlements has been diminished further by the popularity of neoliberal reforms, which have involved reducing their mandate, revenues and spending powers. The solutions to the problems of development in general, and of slums in particular, do not lie in incapacitating states and leaving matters to market forces. As discussed in the previous sections, the outcomes of such policies have been the rapid growth of squatter settlements, deterioration in access to water, and the urban poor's heavy reliance on costly and inferior provision in many low-income economies.

It is important to recognise that states are not uniform structures and they are not always benevolent agents of development. In the disequilibrium of power relations, their actions may too often be aligned with the interests of the rich and non-needy. The corruption of state officials is a serious issue in many parts of the developing world (Davis, 2004; Estache et al., 2007; UNODC, 2001). Preventing slum development and improving slum dwellers' living conditions require the use of public resources such as tax revenues and public land. But there is no guarantee that governments can be reliable agents and can meet the challenges posed by the discussion in this paper, especially given the competing demands for such resources and the presence of rent-seeking and corruption.

One way of tackling the political economy issues involved in public-resource allocation to the provision of essential services such as water and sanitation is to legally enforce the plans and allocation of the necessary resources to meet such goals, irrespective of the political orientation of ruling governments. In other words, access to essential services can be prioritised in the development process in such a way that attainment of such access is considered over and above party politics. The latter can hinder development budgets for most essential services as they fall prey to changing governments and economic and political conditions.

5.3 WATER AND SANITATION: THINKING OUTSIDE THE BOX

Many of the problems encountered in water service provision in informal settlements can be attributed to matters of governance that prevail outside the water services sector. In particular, the issues of housing, land tenure and planning of settlements contribute significantly to the failure of network expansion in these areas. Hence the long-term improvement of conditions in informal settlements in developing countries must be countered by broader policies and strategies that begin by thinking outside "the water and sanitation box" (IIED, 2003).

The broad policy options include "slum upgrading", relocation and social housing policies. Slum upgrading efforts have been widely discussed in the literature and the outcomes are quite mixed. Overall, the success of this policy depends on a number of preconditions: location in non-hazardous terrain, the availability of sufficient public resources and, if necessary, less reliance on cost-recovery strategies, the avoidance of low-quality investment, and good maintenance of existing assets such as pipes, taps and housing stock. When slum upgrading is not feasible because of location-related hazards, relocation of the inhabitants—using public land—is the only alternative.

A more desirable course for developing countries is to move ahead of the growth with which slums develop, instead of adapting to circumstances *ex-post*. This requires extensive urban planning and investment for land, housing and infrastructure. One of the most critical causes of the expansion of unplanned settlements in developing countries is the lack of long-term and low-interest finance for households to acquire homes. In many countries, home ownership requires large amounts of upfront capital or collateral for finance, which poor households do not have. Thus the success of housing policies depends on the institutions developed for financing, such as housing cooperatives, housing banks and housing funds. Singapore, for example, has been very successful in pursuing a development path without the emergence of informal settlements. Over 80 per cent of the country's housing stock is built through the Housing Development Board, which financed its investments from forced savings—that is, employer and employee contributions for housing (UN-Habitat, 2003). A historical review of conditions in the United Kingdom, the United States and continental

European countries also reveals the instrumental role of social housing projects in preventing the growth of slums in these countries (Stone, 2003; Whitehead and Scanlon, 2007).

5.4 THE CENTRAL GOAL SHOULD BE TO EXPAND WATER AND SANITATION SERVICES THROUGH THE PUBLIC NETWORK UTILITY

Long-term policies should be devised in light of the costs and benefits of alternative systems of provision. Our discussion so far casts serious doubt on the potential gains of privatising network utilities in countries where problems of urban planning and development persist. There remain concerns about the pricing and quality of services provided by small-scale water sellers. Ultimately, these concerns can be resolved by investing in the expansion of the public water and sanitation network.

What are the resource implications of enhancing access to water and sanitation? There are no estimates of the cost of investment to extend access to water and sanitation in informal settlement areas, but there are estimates for achieving the MDGs. The cost calculations for meeting the MDG for water (plus sanitation) range from \$US 9 billion to \$US 40 billion, depending on the choices made about the type and scope of access and technology (WWC, 2003 and 2006). These estimates are of limited use for our purposes, since the MDG can be met without any progress being made in the periurban areas. One way to avoid this difficulty is to focus on the cost of achieving universal service provision in water and sanitation. Hutton et al. (2006) estimate that the annual investment cost of achieving universal water and sanitation provision in countries that are not members of the Organisation for Economic Cooperation and Development (OECD) is \$US 166 billion between 2006 and 2015, using low-cost solutions (Table 4). The investment needs in Sub-Saharan Africa and South Asia are greatest when scaled by those regions' GDP. The cost of more desirable solutions involving private household connections is likely to be tolerable for Latin American and East Asian countries. Nonetheless, such high-cost investments are difficult to realise in South Asia and Sub-Saharan Africa without sustained development assistance, even if achievement of universal provision is spread over a longer period than a decade during 2006–2015.

TABLE 4

Annual Cost Estimates for Achieving Universal Coverage for Water and Sanitation (2006–2015, \$US millions)

	Water	Water and Sanitation
Sub-Saharan Africa		
Cost estimates	777	4,156
Cost as % GDP	1.2	6.6
East Asia and Pacific		
Cost estimates	891	5,468
Cost as % GDP	0.3	1.8
South Asia		
Cost estimates	189	5,222
Cost as % GDP	0.2	5.1
Latin America		
Cost estimates	87	821
Cost as % GDP	0.034	0.322

Source: Cost estimates from Hutton et al (2006). Estimates scaled using regional GDPs for 2005.

In the short to medium term, however, essential services, including water, must be supplied irrespective of the ownership of the land in the informal settlement areas. When connection to a public network is technically feasible, the provider (be it public or private) should have the obligation to serve the population in the slums. Where this is technically impractical, then small-scale private providers can be incorporated into the supply system with some degree of regulation, especially involving penalties in the event of excessive charges and poor water quality.

A number of issues are prominent, and these deserve an in-depth consideration that is beyond the scope of this paper. The first is the macroeconomic implications of increased investment and aid for developing countries. The literature on scaling-up aid for investment in infrastructure raises questions about the absorption capacity of low-income countries and the Dutch disease effects of increased spending in non-tradable sectors (Vos, 1998; ODI, 2005; Bourgignon and Sundberg, 2006). While a thorough examination of these issues is beyond the scope of this paper, studies indicate that such adverse effects are not automatic but are dependent on the scale of the projects (Roodman, 2006), the uses of aid flows, and accompanying sterilisation policies (McKinley, 2005). The second issue concerns the lessons to be learned from past public sector failures in the provision of water and sanitation services, and remedial measures to avoid their recurrence in the future. Particular disappointments in this respect have been the inadequate efforts to ensure the technical maintenance of existing infrastructure, and the lack of good management of investment in capital-intensive sectors such as water and sanitation. The third issue is the design of subsidies. Poorly designed subsidies contribute to the failure of network expansion. There should be a greater focus on connection subsidies.

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NOTES

1. Includes piped water, public standpipe shared by a maximum of two households, bore dug well, protected wells and springs, rain water collection; excludes unprotected wells and springs, tanker water, vendor-provided water, bottled water (which may be safe but of limited availability).
2. Includes connections to the public sewer or septic system; private or shared flush or ventilated pit latrines, excludes bucket latrines, public latrines, latrine with an open pit.
3. To make some sense of the water consumption data, it may be useful to indicate that 40 litres of water is the amount dispensed in a 4.2 minute shower, using an eco-friendly, low-flow showerhead (Gulyani et al., 2005).



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